PATENT SPECIFICATION

742,113

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Date of filing Complete Specification: *Nov. 3, 1953.*

Application Date: *Nov. 4, 1952.* *No. 27787/52.*

Complete Specification Published: *Dec. 21, 1955.*

Index at Acceptance:—**Classes 8(1)**, C1E8A; **and 122(1)**, B7E2B.

COMPLETE SPECIFICATION.

Improvements in or relating to Inflators for Cycle and other Road Vehicle Tyres.

We, BLUEMEL BROS LIMITED, a British Company, of Wolston, near Coventry, in the County of Warwick, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to inflators for cycle and other road vehicle tyres of the kind comprising a barrel, a piston element mounted for reciprocatory movement within the barrel and a handle portion for effecting reciprocatory displacement of the piston.

It is already known in inflators of the foregoing kind to provide the periphery of the piston with a sealing washer in the form of a cup washer and to provide through the piston a passage controlled by a form of non-return valve separate from the cup washer, such non-return valve serving to permit of the piston being readily displaced by the user during its inoperative return stroke.

The provision of a sealing washer in the form of a cup washer is open to the objection that this is liable to become distorted after a period of use and is further somewhat difficult to initially insert within the barrel during the assembly of the inflator.

The present invention has for its object the provision of an alternative construction in which the use of a sealing washer in the form of a cup washer is avoided, and at the same time dispenses with the provision of a separate non-return valve.

An inflator according to one aspect of the present invention is characterised by the feature that the piston element is provided with a peripheral annular recess in which is mounted for limited axial movement in relation thereto a sealing member of annular form adapted when the piston is displaced in its operative direction by an inward movement of the handle portion relative to the barrel to have sealing engagement with both the interior of the barrel and with the piston so as to close an opening which communicates between the air spaces within the barrel at each end of the piston element so as to effect compression of the air on that side of the piston element remote from said handle portion, the sealing member being adapted when the piston element is displaced in its opposite inoperative direction to move relatively to said recess into a position in which an opening is provided for the free passage of air within the barrel between the two ends of the piston so as to permit of the latter moving freely during its inoperative or return stroke in which the handle portion is displaced away from the barrel.

An inflator according to another aspect of the invention is characterised by the feature that the piston element is provided with a peripheral annular recess in which is mounted for limited axial movement in relation thereto a sealing member of annular form adapted when the piston is displaced in its operative direction to have sealing engagement with both the interior of the barrel and with the piston so as to close an opening which communicates between the air spaces within the barrel at each end of the piston element, the sealing member being adapted when the piston element is displaced in its inoperative direction to move relatively to said recess into a position in which an opening is provided for the free passage of air between the two ends of the piston so as to permit of the latter moving freely during its inoperative or return stroke, the bore of said annular sealing member being greater than the diameter of the base of said piston element recess, so as to provide an annular opening through which air can freely flow during the inoperative or return stroke of the piston.

The invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a cross sectional view to an enlarged scale of part of a cycle inflator, illustrating the piston element thereof embodying one form of the present invention.

Figure 2 is a sectional view on the line 2—2 of Figure 1.

Figure 3 is a view similar to Figure 1 showing a modified construction.

Figure 4 is a sectional view on the line 4—4 of Figure 3.

Referring firstly to Figures 1 and 2 of the drawings, the inflator there illustrated is intended for use with an ordinary bicycle, and with the exception of the piston element this is of generally conventional form comprising the usual barrel 10 and piston or plunger rod 11 provided at one end with the usual handle and having mounted on the opposite end thereof a piston element, indicated generally at 12.

This piston element is of generally cylindrical configuration comprising upper and lower portions 13, 14 spaced apart from one another by an annular recess 15, the said portions each having a peripheral diameter somewhat less than the internal bore of the barrel 10.

Disposed within the recess 15 is a sealing element in the form of a plain ring 16 of cylindrical form in cross section and formed of rubber or other resilient sealing material, the peripheral diameter of the ring being such that this is in close sealing engagement with the interior of the barrel 10 and the cross sectional diameter of the ring being appreciably less than the width of the groove 15. The bore of the interior of the ring is appreciably greater than the diameter of the base portion of the recess 15, so as to provide between this and the interior of the ring an annular axially extending passage 17.

The lower piston portion 14 is formed with a number of radially extending circumferentially spaced peripheral openings 18, as clearly shown in Figure 2.

The arrangement is such that when the piston is displaced in the downward direction in Figure 1, i.e. in the direction of its operative stroke, the ring 16 moves upwardly into engagement with the upper piston portion 13; i.e. into engagement with the upper side of the recess 15, as indicated in dotted outline in Figure 1, thus sealing the two ends of the piston 12 from one another and permitting of the piston performing its inflating operation.

During the return or inoperative stroke of the piston the ring 16 moves axially of the piston into the position depicted in Figure 1, thus uncovering the peripheral space between the upper piston portion 13 and the interior of the barrel 10 and permitting of air flowing freely through this space and through the annular space 17 within the ring 16, and through the radial openings 18 in the lower piston portion, thereby permitting of free and easy upward movement of the piston element.

Thus, the sealing ring 16 functions as a combined sealing ring for the piston as well as a non-return valve, which ring is not liable to distort after a period of use and can further readily be initially positioned in the barrel during the assembly of the inflator.

With the construction shown in Figures 1 and 2 the piston element is formed as a one-piece member and it is necessary to spring the sealing ring 16 into position within the recess 15.

The construction shown in Figures 3 and 4 is very similar to the preceding construction but in this case the piston element is made in two parts which constitute the two upper and lower piston portions 13, 14, which two parts are secured detachably together by a fastening screw 19 which serves also to secure the piston element to the lower end of the piston rod 11. Such an arrangement permits of the sealing ring 16 being disposed in position between the two parts during their assembly without springing it over the piston element in any way, as is necessary with the preceding construction.

In this case the piston portion 13 is formed as the peripheral flange of a cup-like member 20 which forms also the side of the recess 15, and the lower piston portion 14 is formed, as shown in Figure 4, with a series of round holes 18 in place of the radially extending openings of the preceding construction.

In place of a number of holes 18 in the lower piston portion in each of the constructions above described the lower piston portion may be provided with a single opening only, but the arrangement above described is preferred.

Although the invention has been described as applied to an inflator for a bicycle tyre the invention is applicable to inflators for other forms of cycles, for example motor cycles, as well as to inflators for tyres of other road vehicles.

What we claim is:—

1. An inflator of the kind specified characterised in that the piston element is provided with a peripheral annular recess in which is mounted for limited axial movement in relation thereto a sealing member of annular form adapted when the piston is displaced in its operative direction by an

inward movement of the handle portion relative to the barrel to have sealing engagement with both the interior of the barrel and with the piston so as to close an opening which comunicates between the air spaces within the barrel at each end of the piston element so as to effect compression of the air on that side of the piston element remote from said handle portion, the sealing member being adapted when the piston element is displaced in its opposite inoperative direction to move relatively to said recess into a position in which an opening is provided for the free passage of air within the barrel between the two ends of the piston so as to permit of the latter moving freely during its inoperative or return stroke in which the handle portion is displaced away from the barrel.

2. An inflator of the kind specified characterised in that the piston element is provided with a peripheral annular recess in which is mounted for limited axial movement in relation thereto a sealing member of annular form adapted when the piston is displaced in its operative direction to have sealing engagement with both the interior of the barrel and with the piston so as to close an opening which communicates between the air spaces within the barrel at each end of the piston element, the sealing member being adapted when the piston element is displaced in its inoperative direction to move relatively to said recess into a position in which an opening is provided for the free passage of air betwen the two ends of the piston so as to permit of the latter moving freely during its inoperative or return stroke, the bore of said annular sealing member being greater than the diameter of the base of said piston element recess so as to provide an annular opening through which air can freely flow during the inoperative or return stroke of the piston.

3. An inflator according to Claim 2 further characterised in that said piston element recess is provided at one axial end thereof with an opening which provides a connection from the high pressure or operative end of the piston through the annular opening to a sealable opening at the opposite end of said recess, which sealable opening comunicates with the low pressure end of the piston, the arrangement being such that during the operative stroke of the piston the sealing member moves axially in one direction relatively to the piston to close said sealable opening, the sealing member moving relatively in the opposite axial direction to open connection through the annular opening between the two ends of the recess when the piston is on its inoperative or return stroke.

4. An inflator according to Claim 2 wherein the piston element at the operative or high pressure end thereof is formed with one or more openings intermediate its central axis and its periphery which provide communication between the high pressure end of the piston and the interior of said annular sealing member.

5. An inflator acording to any of the preceding claims wherein the piston element is made in two parts adapted to be secured together, the two parts constituting opposite sides of the said recess, the arrangement permitting of the annular sealing member being disposed between said two parts prior to the assembly of the piston element.

6. An inflator substantially as hereinbefore described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.

7. An inflator substantially as hereinbefore described with reference to and as shown in Figures 3 and 4 of the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Inflators for Cycle and other Road Vehicle Tyres.

We, BLUEMEL BROTHERS LIMITED, a British Company, of Wolston, near Coventry, in the County of Warwick, do hereby declare this invention to be described in the following statement:—

The invention relates to force pumps for air, such as are employed for instance for inflating tyres.

Hitherto, in devices of the kind in which passage of air is required to be permitted in one direction of movement of a reciprocating piston or plunger, but not in the other, it has been customary to provide the periphery of the piston with a packing in the form of a cup-washer, and to provide through the piston a passageway controlled by some sort of non-return valve.

A cup-washer or leather or like packing in a tyre pump soon becomes distorted and it is the object of the present invention to provide for a force pump or the like, a form of piston construction which will not only obviate the disadvantages of known packings, but will also form or incorporate a simplified form of non-return valve.

The invention is characterised in that a piston member, slidable in a cylinder, is provided with a peripheral groove in which is located a rubber or equivalent resilient ring of a diameter or width suitably less than the width of the groove, and if non-circular in section of such thickness, or if of circular section of such a diameter that appropriate clearance is left between it and the base of the groove. The normal or unexpanded outer diameter of the rubber or like sealing ring is so chosen and the walls of the groove in the piston are so formed that as the piston is moved in one direction for the suction stroke, the ring will maintain such contact with the wall of the cylinder as to cause it to move to the opposite or delivery side of the groove and the air or liquid be permitted to flow through the groove into the pump cylinder. When the piston is moved in the opposite direction, for the compression stroke, the sealing ring moves back to close the entrance to the groove on the suction side, and the pressure against which the air or liquid is being forced out of the cylinder not only holds the ring tightly over the suction entrance but also expands against the wall of the cylinder to prevent backward leakage past it.

A device according to the invention is capable of embodiment in various ways. In one embodiment the piston may be a solid member with a peripheral groove formed around it. The wall of this groove on the pressure side of the piston may be a sliding fit in the cylinder and be formed with a series of radial slots of relatively large size and combined area, the radial depth of such slots being suitably greater than the diameter or radial thickness of the rubber sealing ring which is suitably less than the depth of the groove.

The opposite wall of the groove, on the suction side of the piston, may be made of a diameter suitably less than that of the bore of the cylinder so that an annular clearance of predetermined area is left between it and the cylinder wall, or alternatively this wall of the groove may be a sliding fit in the cylinder and be formed with a plurality of shallow radial slots spaced apart around its periphery, the area of the annular clearance on the combined area of the shallow radial slots being such as to permit of free passage of air into the piston groove as the piston makes a suction stroke, and being further such as to be closed by the sealing ring when the piston moves forwardly on a compression stroke. The piston may have an integral threaded projection to enable it to be attached to a rod or plunger, or it may have an axial central opening for the passage of a screw.

In another embodiment the piston may be made in two parts screwed together and so fashioned as to present between them an annular peripheral groove of the desired width and depth. In this form of construction one part of the piston, say that on the suction side, may be in the form of a flat disc, and the other portion be in the form of a centrally dished disc, the crown of which has a central opening through which passes a screw adapted to secure the two parts together and connect them to end of the piston rod or plunger.

In the form of construction first described the resilient ring will require to be sprung into the groove before assembly, whilst in the last described arrangement the separation of the two parts of the piston enables the ring to be placed in position before the two parts are secured together.

The essential feature of the invention, whatever construction in detail may be adopted, is the provision in or on a pump piston of a peripheral annular groove in which is located a resilient ring dimensioned and functioning in the manner described, and the formation of the walls of the groove in such a manner that the air may pass freely into the pump cylinder on the suction stroke but is prevented from being forced backwardly on the compression stroke.

It will be understood that the positions of the parts may be reversed, that is to say, the sealing arrangement may be carried by the pump cylinder and the piston or plunger of any ordinary form slide through it.

FORRESTER, KETLEY & CO.

Abingdon ; Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1955.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
from which copies may be obtained.

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1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

FIG. 1.

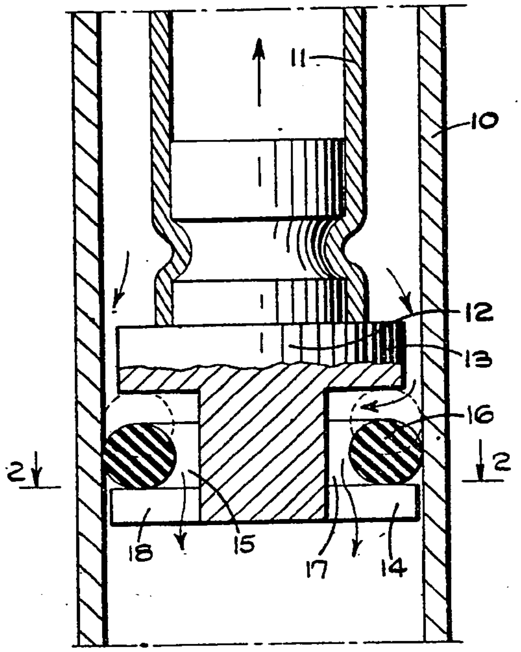


FIG. 2.

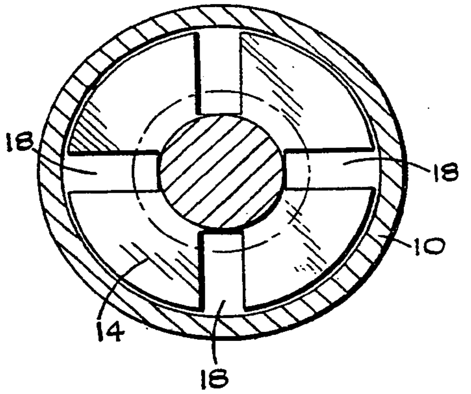


FIG. 3.

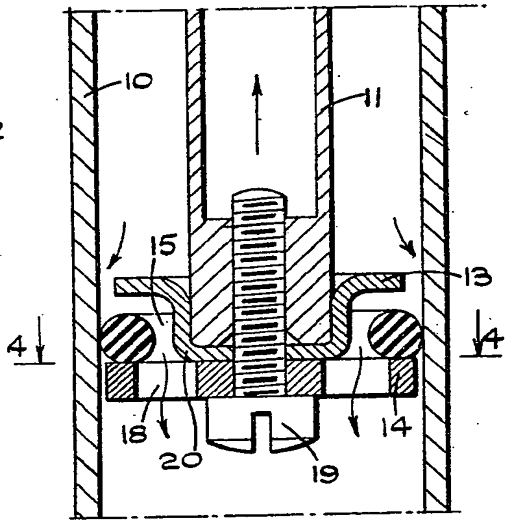
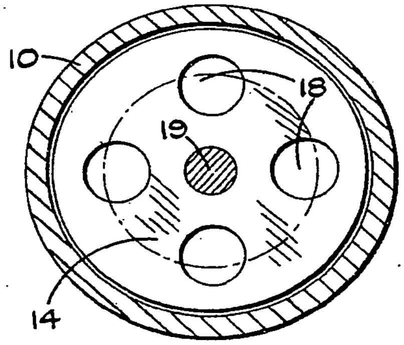


FIG. 4.



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